

## CLAIMS

What is claimed is:

- 1           1.     A lighting arrangement comprising:  
2           a source of electrical power; and  
3           at least one pair of light-emitting diodes (LEDs) driven by the power source and  
4     connected in parallel such that an anode of a first one of the LEDs in the pair is  
5     electrically connected to the cathode of the other, second LED in the pair, and the  
6     anode of the second LED is electrically connected to the cathode of the first LED in the  
7     pair, one of each pair of LEDs thereby being forward biased to produce light regardless  
8     of the instantaneous polarity of electrical current supplied to the LED pair by the power  
9     source.
- 1           2.     An arrangement as in claim 1, further comprising a current-limiting device,  
2     connected in series between the power source and each LED pair.
- 1           3.     An arrangement as in claim 1, further comprising a plurality  $m$  of LED  
2     pairs connected in series in each of  $n$  parallel paths.
- 1           4.     An arrangement as in claim 1, further comprising:  
2           a printed circuit board (PCB) base having front and rear surfaces and laterally  
3     extending side-edge protrusions; and  
4           contact surfaces on edge surfaces of the protrusions;  
5           the PCB base forming a mounting substrate for the LED pairs.
- 1           5.     An arrangement as in claim 4, in which the protrusions are positioned so  
2     as to mate with at least one internal contact surface of a light fixture.
- 1           6.     An arrangement as in claim 5, in which the light fixture is a screw-in fitting.

1           7.     An arrangement as in claim 5, in which the light fixture is a bayonet fitting.

1           8.     An arrangement as in claim 5, in which the light fixture is a flanged fitting.

1           9.     An arrangement as in claim 5, in which the light fixture is a wedge-based  
2 fitting.

1           10.    An arrangement as in claim 5, in which the light fixture is a standard, after-  
2 market fitting designed to receive an incandescent light bulb.

1           11.    An arrangement as in claim 5, further comprising a biasing arrangement  
2 that biases the contact surfaces of the protrusions into electrical contact with the internal  
3 contact surfaces.

1           12.    An arrangement as in claim 5, further comprising at least one slot in the  
2 PCB base forming a region of lateral compression, the PCB base having a width equal  
3 to or slightly greater than an internal dimension of the light fixture, compression of the  
4 PCB base, upon installation of the PCB base in the fixture, creating a lateral biasing  
5 force biasing the contact surfaces of the protrusions into electrical contact with the  
6 internal contact surfaces of the fixture.

1           13.    An arrangement as in claim 4, further comprising a separate pair of  
2 parallel-connected LEDs on the front and back surfaces of the PCB base, one LED in  
3 each pair being forward biased at the same time as a corresponding LED in the other  
4 pair, whereby front-and-back illumination is provided by the LED pairs on the single  
5 PCB substrate.

1           14.    An arrangement as in claim 1, in which the power source supplies  
2 unrectified alternating current to each LED pair.

1           15.    An arrangement as in claim 1, in which:  
2           a plurality of LED pairs are mounted on a single printed circuit board (PCB) base;  
3   and  
4           the plurality of LED pairs include at least three pairs producing light of each of  
5   three colors, whereby objects illuminated by the arrangement appear to a viewer to be  
6   illuminated by full spectrum white light.

1           16.    An arrangement as in claim 15, in which the colors are red, green and  
2   blue.

1           17.    An arrangement as in claim 1, in which the LED pair comprises two LED  
2   dies mounted with reverse polarity within a single LED casing.

1           18.    An arrangement as in claim 1, in which:  
2           a plurality of LED pairs are mounted on a single printed circuit board (PCB) base  
3   and the LEDs are separated by no more than 1 mm;  
4           a duty cycle of each LED in each pair is no more than 50%, whereby heat  
5   generated by the plurality of LED pairs is reduced and heat dissipation is increased.

1           19.    A lighting arrangement comprising:  
2           a source of electrical power;  
3           at least one pair of light-emitting diodes (LEDs);  
4           a current-limiting device, connected in series between the power source and  
5 each LED pair;  
6           a printed circuit board (PCB) base having front and rear surfaces and laterally  
7 extending side-edge protrusions, the PCB base a mounting substrate for the LED pairs;  
8 and  
9           contact surfaces formed on edge surfaces of the protrusions;  
10          in which:  
11          the power source supplies unrectified alternating current to each LED pair;  
12          each LED pair is driven by the power source;  
13          the LEDs in each pair are connected in parallel such that an anode of a first one  
14 of the LEDs in the pair is electrically connected to the cathode of the other, second LED  
15 in the pair, and the anode of the second LED is electrically connected to the cathode of  
16 the first LED in the pair; one of each pair of LEDs thereby being forward biased to  
17 produce light regardless of the instantaneous polarity of electrical current supplied to the  
18 LED pair by the power source; and  
19          the protrusions are positioned so as to mate with at least one internal contact  
20 surface of a fitting designed to receive an incandescent, plasma-based fluorescent or  
21 halogen bulb.

1           20.    A method for forming lateral contact surfaces on a printed circuit board  
2 (PCB) that forms a substrate for light-producing elements comprising:  
3           creating protrusions from the periphery of a base by boring or routing through-  
4 holes in the PCB with a pitch or indexing corresponding to at least one internal mating  
5 surface of a light fixture; and  
6           depositing an electrically conductive material within the through-holes.